

**SINGLE TONE PROCESS WINDOW METROLOGY TARGET AND
METHOD FOR LITHOGRAPHIC PROCESSING**

ABSTRACT OF THE DISCLOSURE

- 5 A metrology target mask for determining proper lithographic exposure dose and/or focus in a pattern formed in a layer on a semiconductor substrate by lithographic processing. The target mask comprises a mask substrate and a first, dose and focus sensitive mask portion on the mask substrate having a first array of elements comprising a plurality of spaced, substantially parallel elements having essentially the
10 same length and width. Ends of the individual elements are aligned to form first and second opposing array edges, with the lengths of and spaces between the elements being sensitive to both dose and focus of an energy beam when lithographically printed in a layer on a semiconductor substrate. The target mask also includes a second, dose sensitive mask portion on the mask substrate having a second array of elements
15 comprising a central element having a length and a width, and a plurality of spaced, substantially parallel outer elements having a length and a width. The width of the outer elements is less than the width of the central element, with edges of outer elements on each side of and farthest from the central element forming opposing array edges. The pitch of the outer elements is selected such that the outer elements are not
20 resolvable after lithographic printing in a layer on a semiconductor substrate. The resulting printed second target portion width is sensitive to dose but not focus of the energy beam. Dose and/or focus of the energy beam during lithographic processing of the layer may be determined after projecting an energy beam through the mask and lithographically printing the mask portions in a layer on a semiconductor substrate and
25 determining the widths of the first and second target portions in the layer by measuring distance between opposing array edges in each of the first and second portions.

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